Abstract

A prior method for designing transition curves for railroad tracks and other vehicle guideways begin with a choice of a roll function representing a functional form for variation of the track or guideway roll or cant angle as a function of distance and requires the curvature of the transition shape to keep the components of centripetal and gravitational acceleration in the plane of the track or guideway equal at each point along the shape and integrates the equation expressing that equality as part of a procedure for determining the resulting transition curve shape. That method is supplemented by a method of defining basic roll functions in terms of Gegenbauer orthogonal polynomials, including roll functions which generate simple spirals as well as more complex shapes (referred to as bends, jogs, and wiggles). Roll functions for the various shapes are defined as weighted sums of the basic roll functions, and can generate transition curve shapes that have good dynamic characteristics and that are more general than the shapes that can be constructed using the prior method. A resulting generalized spiral can be used to compensate for inadequate offset when a spiral needs to be lengthened for operation at higher speed or to realign an existing spiral whose shape has become so different from its original design shape that restoration to that shape would be impractical.